



Australian Government

Department of Communications and the Arts

Regulation Impact Statement—Allocation limits for the 3.6 GHz spectrum auction

July 2018

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Introduction

This Regulation Impact Statement (RIS) has been prepared by the Commonwealth Department of Communications and the Arts. The purpose of this RIS is to assist the Minister for Communications, Senator the Hon Mitch Fifield (the Minister) to decide if allocation limits should be imposed for the auction of spectrum in the 3575–3700 MHz frequency range (the 3.6 GHz band) and if so, what those limits should be. A decision would be made under subsection 60(10) of the *Radiocommunications Act 1992* (the Act).

Spectrum in the 3.4–3.8 GHz frequency range has been identified internationally as a pioneer band for the development and deployment of 5G technologies. 5G is the next (fifth) generation of mobile telecommunications technology and although still in its infancy, is expected to deliver unprecedented data speeds to and from mobile devices with near-zero latency. 5G technology is predicted to enable the delivery of services such as driverless cars, smart farming, the Internet of Things, and remote healthcare.

Early 5G mobile broadband services are likely to be an evolution from existing 4G mobile broadband technology, much like 4G was an evolution of 3G. 5G networks will initially compete with 4G networks until most, if not all, mobile broadband services migrate to 5G networks. It is expected that carriers will continue to operate 4G networks in parallel with 5G networks.

Australia will be one of the first countries to auction spectrum in the 3.4–3.8 GHz frequency range. On 8 March 2018, the Minister issued declarations to re-allocate 125 MHz of spectrum in the 3.6 GHz band for spectrum licensing in preparation for an auction of spectrum that is planned to commence in October 2018. The Minister's decision reflected a recommendation from the Australian Communications and Media Authority (ACMA) following public consultation by the ACMA. Although the ACMA has not yet made the auction instruments, it is intending to auction the 125 MHz of spectrum in 25 x 5 MHz lots. Auctioning the spectrum in 5 MHz lots allows for more flexibility for bidders to acquire the amount of spectrum they want compared with auctioning the spectrum in larger lots of 25 MHz, for example. The ACMA will sell the spectrum using an Enhanced Simultaneous Multi-Round Ascending (ESMRA) auction format. This is a three-stage auction methodology, comprising:

- a **primary** stage, which is a clock auction for frequency-generic lots;
- a **secondary** stage, if required, for the sale of lots which were not purchased in the primary stage; and
- an **assignment** stage, for assignment of lots to the specific frequencies within the band.¹

An ESMRA auction format allows bidding on generic lots within each region and provides an assignment stage to allocate the spectrum won in a contiguous block of that bandwidth. It reduces the fragmentation risk associated with the Simultaneous Multi-Round Ascending (SMRA) format, where each lot is bid on separately and contiguity within the region is not guaranteed.

This RIS has been developed in accordance with the Australian Government Guide to Regulation, March 2014, issued by the Office of Best Practice Regulation (OBPR) in the Department of the Prime Minister and Cabinet, and in consultation with the OBPR. Relevant guidance notes issued by the OBPR have also been taken into account.

¹ For more information the proposed auction structure please see:
<https://www.acma.gov.au/theACMA/spectrum-tune-up-3-6-ghz-band-auction-system>

What is the problem being solved?

This RIS considers whether the Minister should direct the ACMA to impose allocation limits for the auction of 125 MHz of spectrum in the 3.6 GHz band and if so, what those allocation limits should be. Spectrum is a valuable and finite resource. This is the first auction of spectrum for 5G technology in Australia, and 125 MHz is not enough to satisfy the spectrum requests of every mobile network operator (MNO) seeking to roll out a 5G network in the short term. The allocation also represents a new supply of spectrum that could be used for 4G/LTE services. This is particularly pertinent for the new entrant in the Australian mobiles market. There is a theoretical incentive for one or two MNOs to acquire the maximum amount of spectrum possible at the auction in order to prevent competitors from acquiring spectrum.

MNOs that are unable to acquire sufficient 3.6 GHz spectrum at the auction could be disadvantaged in terms of their ability to deploy a 5G network contemporaneously with their competitors. This could result in one or two MNOs having first mover advantage in the 5G market and the remaining MNOs being unable to compete on 5G services initially. If only a small number of MNOs are able to offer 5G services, it could negatively impact consumers in terms of service, quality and price for 5G services and fail to maximise overall public benefits.

Why is Government action needed?

The Government supports a competitive mobile telecommunications market. The decision to re-allocate the 3.6 GHz band for spectrum licensing and to conduct an auction has been completed. Hence this is not a question of whether the Government should auction the band, but rather what allocation limits, if any, should be used to ensure that the spectrum being sold moves to its most efficient use.

In considering how the problem should be solved, the Department has had regard to the Government's communications policy objectives, which are outlined in the following table.

Table 1: Government's communications policy objectives

Objective	Description
Competitive market outcomes	The Government seeks to ensure that spectrum auctions result in competitive market outcomes. The <i>Telecommunications Act 1997</i> , read together with the <i>Competition and Consumer Act 2010</i> , promotes the long-term interests of end users of carriage services and the efficiency and international competitiveness of the Australian telecommunications industry.
Efficient allocation and use of spectrum	The objects of the <i>Radiocommunications Act 1992</i> provide that the overall public benefit derived from the use of spectrum should be maximized by ensuring the most efficient allocation and use of the spectrum. Allowing the market to determine the price of spectrum through an auction process promotes allocative efficiency. However markets can be adversely affected by auctions. Allocation limits can be an effective tool to ensure that auctions do not adversely affect future competition in downstream markets.

Objective	Description
Encouraging secondary trading	The Government supports secondary spectrum trading amongst commercial entities. Spectrum trading allows spectrum to be transferred to, and used by, the user who values it most. Over time, this should ensure that more spectrum is employed in the use that brings the greatest benefit to the economy. This ensures the most efficient allocation and use of the spectrum and provides a regulatory environment that maximizes opportunities for the Australian communications industry.
Supporting 5G networks	<p>The Government supports the deployment of 5G technologies, including by making relevant spectrum available in a timely manner. Spectrum in the 3.4–3.8 GHz frequency range has been recognized internationally as a pioneer band for 5G technologies.</p> <p>This aligns with the policy directions paper <i>5G – enabling the future economy</i>, which was released by the Minister on 12 October 2017. The paper outlines the activities the Government will undertake to support the development of 5G, including making spectrum available in a timely manner.</p>
Investment in infrastructure	The Government supports continued investment in mobile and fixed broadband infrastructure and networks, including in regional Australia. Operators of mobile networks now cover between 96 and 99 per cent of the Australian population. Auctioning spectrum in the 3.6 GHz band will allow operators to continue to conduct trials and roll out the next wave of mobile developments including 5G. Long term network investment will assist with reducing connectivity divides between regional and metropolitan Australia.

Under section 60 of the Act, the Minister has the power to direct the ACMA to develop procedures to impose allocation limits on the sale of spectrum. In making such a decision, the objects of the Act are relevant. One of these is providing for the management of the radiofrequency spectrum in order to support the communications policy objectives of the Commonwealth Government (subsection 3(f) of the Act). At the time of making the re-allocation declarations, the Minister sought advice from the Australian Competition and Consumer Commission (ACCC) about whether he should direct the ACMA regarding allocation limits for the 3.6 GHz auction, and if so, what the ACCC considers those limits should be. The ACCC conducted targeted stakeholder consultations, and provided its advice to the Minister on 4 May 2018.

The ACCC advised that allocation limits would be necessary for the allocation to:

- prevent NBN Co Limited (nbn) from trying to acquire spectrum that could be used by MNOs to provide 5G wireless services in competition with broadband services over the National Broadband Network, and
- ensure that the new entrant TPG Telecom (TPG) has an opportunity to acquire sufficient spectrum to compete with the incumbents.



The Department assesses that allocation limits on the sale of spectrum are the most suitable option for mitigating the risk of carriers monopolising the 3.6 GHz spectrum. Allocation limits work by placing a cap on the amount of spectrum carriers can acquire in an auction. For example, an allocation limit of 100 MHz in an auction of 250 MHz of spectrum would mean that no carrier is allowed to acquire spectrum at the auction which would result in its holdings exceeding 100 MHz in that band.

Absent allocation limits, there is a real risk that a larger, well-resourced bidder may acquire all or most of the available spectrum, thereby excluding other bidders from accessing spectrum. This would have a consequential detrimental impact on consumers through a diminution of competition in the market.

Accounting for existing spectrum holdings

Allocation limits used in previous spectrum auctions have only taken into account carriers' existing spectrum holdings in the specific band being auctioned. For example, in the 700 MHz residual lots auction in 2017, limits of 2 x 20 MHz were applied specifically in the 700 MHz band. As a result Telstra Corporation Limited (Telstra) was precluded from bidding because it already held 2 x 20 MHz in that band. In the case of the 3.6 GHz auction, the ACCC recommended existing spectrum holdings in bands that are a close substitute for the 3.6 GHz band should be taken into account when determining how allocation limits should be applied.

There are several existing spectrum bands that could, in time, be used for 5G, including spectrum in the 1–6 GHz frequency range and spectrum in the frequency range above 24 GHz (mmWave spectrum). However at present, spectrum holdings in the 1800 MHz, 2 GHz, 2.3 GHz, and 2.5 GHz bands are not a close substitute for the 3.6 GHz band for several reasons. Development of 5G technical standards are focussed on the 3.4–3.7 GHz frequency range and on time division duplex (TDD) technical specifications. Current spectrum holdings in the 1800 MHz, 2 GHz, 2.3 GHz and 2.5 GHz bands are in a frequency division duplex (FDD) configuration, which is not compatible with a TDD configuration. The ACMA would need to re-plan FDD-configured bands to a TDD configuration to meet 5G standards, or alternatively wait until such a time that 5G standards have evolved to include FDD configurations before these bands can be repurposed for 5G. Further, spectrum holdings below 2.5 GHz are thought to be less feasible for certain technical benefits that 5G is expected to enable (for example multiple input multiple output, or MIMO, applications).

The 3.4–3.5 GHz frequency range is the closest substitute for the 3.6 GHz band and can provide the same benefits in terms of 5G technology as the 3.6 GHz band. In its advice to the Minister, the ACCC recommended that existing spectrum licence holdings in the 3.4–3.5 GHz frequency range should be taken into account when determining allocation limits for the auction. The Department agrees with the ACCC's recommendation. There are several carriers with existing spectrum holdings in the 3.4–3.5 GHz frequency range including nbn, Singtel Optus Limited (Optus) and Telstra.

nbn has holdings in the 3.4–3.5 GHz band which it uses to deliver its fixed wireless services. It has spectrum licensed holdings in the 3.4 GHz band in outer metropolitan and regional areas and 60 MHz of 3.4 GHz apparatus licenced spectrum in metropolitan and outer metropolitan areas (in addition to this there is 15 MHz of 3.4 GHz band spectrum currently not licenced to nbn that is used as guard bands). Combined, nbn has access to between 65–160 MHz of spectrum in the 3.4–3.5 GHz band across Australia.

nbn's apparatus licenced holdings in the 3.4 GHz band are Public Telecommunications Service (PTS) licences for public mobile telecommunications Class B services (PMTS Class B), meaning they are wide area licences that can be used to deploy similar services to spectrum licences. For this reason the Department assesses that this type of apparatus licence should be taken into account when determining how much additional spectrum a bidder can acquire at auction.



nbn's holdings are a relevant consideration because while not all MNOs have indicated an intention to offer fixed wireless services, the spectrum on offer is suitable for those services and if they did so, the MNO's would be operating in the same market as nbn.

Optus has holdings in the 3.4 GHz band in all metropolitan areas. It has a cumulative total of 100 MHz in Sydney and Melbourne² and at least 65 MHz in other metropolitan areas. The Department agrees with the ACCC that Optus' current spectrum licence holdings in the 3.4 GHz band are sufficient for it to deploy a 5G network in metropolitan areas and should be taken into account when determining how the allocation limits should be applied.

Telstra currently has 3.4 GHz band holdings in some metropolitan areas and regional centres. It does not hold any 3.4 GHz spectrum in the Sydney and Melbourne metropolitan areas. The Department agrees with the ACCC that Telstra's spectrum licence holdings in the 3.4 GHz band should be taken into account when determining how allocation limits should be applied.

Competition measures and market structure

When Governments regulate markets to deliver pro-competitive outcomes, they can consider imposing ex ante or ex post obligations. Ex ante obligations are imposed when a Government wishes to preclude particular market structures or deliver a particular market structure—for example, Governments may wish to ensure there are a certain number of participants in a market, and therefore impose spectrum allocation limits designed to achieve this. Ex post obligations respond to the actions of players in a market. They can be used to address anti-competitive conduct by those market players, but they cannot be used to change the structure of the market.

Ex post telecommunications-specific competition laws are set out in Part XIB of the *Competition and Consumer Act 2010*. Telecommunications providers are also subject to the general proscription on misuse of market power in section 46 of that Act. Part XIB provides that a carrier or a carriage service provider (CSP) engages in anti-competitive conduct if the carrier or CSP has a substantial degree of power in a telecommunications market and takes advantage of that power in that or any other market with the effect, or likely effect, of substantially lessening competition in that or any other telecommunications market. Part XIC sets out a telecommunications access regime; under this regime, the ACCC has powers to regulate specific wholesale services and determine terms and conditions of supply for those services.

These powers can be used to promote competition, but they cannot be used to reset the structure of a market. For example, if the Government decided that there could only be one or two mobile broadband providers and did not set allocation limits, Part XIC could be used to force those providers to supply specific services on a wholesale basis, and Part XIB could be used to discourage practices that substantially lessen competition. In particular, they do not tend to address the incentives that telecommunications providers have to favour their own operations over those of wholesale customers who may also be their competitors, and they cannot be used to force providers to give up spectrum to competitors. There is therefore the danger that the companies that control the spectrum may be able to limit the effectiveness of competition. As a result, the use of ex ante measures, such as spectrum allocation limits, are more appropriate to deliver a market structure that promotes greater competition and, thereby, consumer welfare.

² Optus' holdings in the 3.4 GHz band in Sydney and Melbourne metropolitan areas are in two non-contiguous blocks of 67.5 MHz and 32.5 MHz.

What policy options are being considered?

There are three options being considered. Options under consideration are as follows:

- **Option 1: Do nothing:** No allocation limits would be imposed for the auction. This would minimise government intervention in the operation of the auction, however this would create a risk that carriers could try and monopolise the available spectrum in order to limit competitors' ability to compete in the emerging 5G market. The ACCC did not support this option as it considers the option risks nbn defensively acquiring spectrum to prevent competition from MNOs and increases the risk that a fourth or hypothetical fifth market entrant will not be able to acquire spectrum.
- **Option 2: Impose allocation limits across the 3.4–3.7 GHz band of 45 MHz in Sydney and Melbourne metropolitan areas³ and 60 MHz in other metropolitan areas and regional areas⁴:** This option addresses the issues raised by option 1 (imposing no allocation limits in the auction), that is, the risk of nbn acquiring spectrum that could be used by MNOs to compete in the fixed wireless market and to ensure that the new entrant TPG has the opportunity to acquire sufficient spectrum to compete in the market. These limits would guarantee that all carriers who are eligible to bid in the Sydney and Melbourne metropolitan areas would be able to acquire spectrum in those areas. This option is consistent with the ACCC's advice to the Minister.
- **Option 3: Impose allocation limits across the 3.4–3.7 GHz band of 60 MHz in metropolitan areas and 80 MHz in regional areas:** This option also addresses the issues raised by imposing no allocation limits in the auction and provides opportunity for all eligible carriers to compete to acquire spectrum in the auction.

Who is affected and what is the impact?

Compliance costs

None of the options under consideration involve increased compliance costs for auction participants compared to previous spectrum auctions (for example, the multiband residual lots auction conducted in late 2017, the 700 MHz residual lots auction conducted in April 2017, and the regional 1800 MHz auction conducted from November 2015 to February 2016). Further, organisations are not required to participate in the auction - they are free to choose whether to participate in the auction and, if they participate, the nature and extent of their participation.

Business impacts

Competition settings are just one of many variables which are relevant to assessing the business impacts of setting, or not setting, allocation limits for the 3.6 GHz spectrum auction. For example, the outcomes of any auction are difficult to predict, and the Government does not have access to sensitive commercial information about bidders' private valuations of the spectrum, or their precise plans to utilise the spectrum to deploy services. A failure to acquire sufficient spectrum may necessitate additional investment in network infrastructure and technology to meet growing capacity demands.

³ Metropolitan area has the meaning given in section 6 of the Radiocommunications (Spectrum Licence Limits—3.6 GHz Band) Direction 2018.

⁴ Regional area has the meaning given in section 6 of the Radiocommunications (Spectrum Licence Limits—3.6 GHz Band) Direction 2018.



Costs to government

Competition settings are just one of many variables that are likely to impact the revenue generated by the auction – other factors include reserve prices (which are yet to be set by the ACMA), each bidder's own valuation of the spectrum, and other commercial and market considerations.

What is the likely net benefit of each option?

Option 1

No allocation limits for the auction would have a net cost rather than a net benefit. No limits would not address the incentive for carriers to monopolise the spectrum. In an unrestricted auction, the spectrum for sale is not always allocated to its highest value use. This is because bidders have incentives to prevent competitors from acquiring spectrum in order to undermine competition in the downstream markets. The ACCC and the Department agree that allocation limits should be applied, in order to mitigate the risk of a monopoly or duopoly in the Australian mobile telecommunications market.

No allocation limits could also have the effect of reducing competition in the auction if one carrier outbids the other carriers for the entire amount of spectrum available. This would reduce competition and possibly reduce government revenue from the sale.

Likewise, if one or two carriers acquire large amounts of spectrum, and the remaining amount of spectrum is not enough to run a commercially viable 5G network, there is a risk that the remaining spectrum could be unsold and lie fallow, producing neither revenue, nor productivity benefits for Australia.

Option 2

The allocation limits would apply across the 3.4–3.7 GHz frequency range to ensure that holdings in these adjacent spectrum bands that are also suitable for early 5G deployment (for example the substantial holdings of Optus and nbn, and smaller holdings of Telstra), are taken into account in assessing how much spectrum each operator may acquire at auction. The limits would apply in metropolitan and regional areas to promote competition among carriers in both regional and metropolitan areas.

According to the ACCC, these limits seek to balance the promotion of competition by ensuring that the new entrant, TPG, has the opportunity to acquire sufficient spectrum in order to have a strong entry into the mobiles market, with the additional benefit to consumers of all MNOs having the ability to deploy 5G networks in the short-term. The limits support the development of 5G networks in Australia, and are consistent with MNOs' submissions to the ACCC that 40 MHz is the minimum amount of spectrum required to deploy a 5G network.

The limits also take into account the fact that spectrum is a scarce resource and that access to spectrum is a barrier to entry due to its high cost to acquire, and the incentives of incumbents to acquire more than they need. The recommended limits would ensure that a key barrier to entry for the new entrant TPG is removed, as the limits enable it to acquire sufficient spectrum to facilitate a strong entry into the mobiles market and to compete effectively with incumbents in the short and longer term, thus promoting competition in relevant markets.



A table showing what each carrier could acquire if these limits were imposed is at [Attachment A](#).

- nbn would be unable to acquire spectrum in all metropolitan and regional areas due to its significant existing spectrum holdings in the 3.4 GHz band.
- Optus would be unable to acquire spectrum in all metropolitan areas due to its significant existing spectrum holdings in the 3.4 GHz band in those areas. It would be able to acquire up to 60 MHz in all regional areas except regional Western Australia, where its existing spectrum holdings in the 3.4 GHz band mean it would be unable to bid there.
- Vodafone Hutchison Australia (VHA) and TPG would be able to acquire up to 45 MHz in Sydney and Melbourne metropolitan areas and up to 60 MHz in all other metropolitan and all regional areas as neither carrier has existing spectrum holdings in the 3.4–3.7 GHz frequency range.
- Telstra would be able to acquire up to 45 MHz in the Sydney and Melbourne metropolitan areas and between 25 – 35 MHz in other metropolitan areas due to its existing spectrum holdings in the 3.4 GHz band. It would be able to acquire between 25 – 60 MHz in regional areas due to its existing holdings in the 3.4 GHz band in some regional centres.

Option 3

These allocation limits address the same key issues as the limits proposed in option 2. The limits would apply across the 3.4–3.7 GHz range to ensure that holdings in relevant adjacent spectrum bands are taken into account. They would apply in metropolitan and regional areas to promote competition in both markets and provide opportunity for TPG to acquire sufficient spectrum to facilitate an entry into the 5G market and to compete effectively with the incumbents in the short and longer term.

The Department assesses the allocation limits in option 3 to have additional benefits to those in option 2. By allowing bidders to bid on larger amounts of spectrum in each area, the limits would increase aggregate demand for the 125 MHz of spectrum for sale at auction, thus increasing competitive tension and reducing the risk of unsold lots. Competitive tension also increases the likelihood that the spectrum will be won by the participant who values the spectrum most, and is therefore most likely to put the spectrum to efficient use. This would benefit consumers and is a key policy objective of the Government and object of the Act.

A table showing what each carrier could acquire if these limits were imposed is at [Attachment B](#).

- nbn would be unable to acquire spectrum in all metropolitan and regional areas except for regional Western Australia due to its significant existing spectrum holdings in the 3.4 GHz band.
- Optus would be unable to acquire spectrum in all metropolitan areas due to its significant existing spectrum holdings in the 3.4 GHz band in those areas. It would be able to acquire up to 80 MHz in all regional areas except regional Western Australia, where its existing spectrum holdings in the 3.4 GHz band mean it would be able to acquire up to 15 MHz.
- VHA and TPG would be able to acquire up to 60 MHz in all metropolitan areas and up to 80 MHz in all regional areas as neither carrier has existing spectrum holdings in the 3.4–3.7 GHz frequency range.
- Telstra would be able to acquire up to 60 MHz in the Sydney and Melbourne metropolitan areas and between 25–35 MHz in other metropolitan areas due to its existing spectrum holdings in the 3.4 GHz band. It would be able to acquire between 45–80 MHz in regional areas due to its existing holdings in the 3.4 GHz band in some regional centres.



Who will you consult?

The ACCC undertook targeted stakeholder consultation with a range of stakeholders including TPG, Optus, Telstra, VHA and nbn. The ACCC requested feedback from these stakeholders on a range of issues including:

- the likely intended uses of 3.6 GHz spectrum;
- the optimal allocation of 3.6 GHz spectrum for the likely intended uses;
- when a service using the 3.6 GHz spectrum could be provided;
- if any substitutes exist for the likely intended uses of the 3.6 GHz spectrum and the extent to which these are full-effective substitutes;
- what the likely effects would be if carriers were unable to acquire 3.6 GHz spectrum;
- what the relevant downstream markets for the purposes of the ACCC's analysis are;
- whether allocation limits would promote competition in those downstream markets;
- to what extent the relevant downstream markets could be considered to be competitive;
- how the state of competition differs in metropolitan and regional areas of Australia;
- whether allocation limits are necessary for the 3.6 GHz spectrum auction;
- what appropriate allocation limits for the auction would be;
- whether the allocation limits should apply to all bidders;
- whether existing spectrum holdings should be considered in an assessment of allocation limits;
- the frequency bands that should be considered in determining the effect of allocation limits;
- what factors the ACCC should consider in its consideration of existing spectrum holdings when assessing possible allocation limits; and
- any other factors the ACCC should consider in its assessment of possible allocation limits.

The key issues noted by stakeholders were as follows:

- **Minimum spectrum requirement for a 5G network:** [This text has been redacted].
- **Optimal spectrum amount for a 5G network:** [This text has been redacted].
- **Preferred allocation limits:** All carriers who made submissions to the ACCC's consultation process stated that allocation limits should be used for the auction. [This text has been redacted].

What is the best option from those you have considered?

Option 3 (allocation limits of 60 MHz in metropolitan areas and 80 MHz in regional areas) is the preferred option in this case.

Option 1 (no allocation limits) meets none of the government's communications policy objectives and could result in a monopoly or duopoly being created in the Australian mobile telecommunications market. If no allocation limits are imposed on the auction, there is a strong likelihood that one or two carriers would acquire the majority of the available spectrum and dominate the market, resulting in anti-competitive outcomes for consumers. This would be contrary to the government's communications policy objective of encouraging competitive market outcomes.

No allocation limits would also be contrary to the efficient allocation and use of spectrum. Carriers with large existing spectrum holdings and access to finance may have a strong incentive to bid aggressively in the auction to acquire the maximum amount of spectrum available. Doing so could prevent a fourth or hypothetical fifth player from entering the market and would be likely to preserve the larger carriers' hold on the market. Smaller entrants who anticipate this outcome may choose not to participate in the auction and avoid participation costs. A lower number of auction participants could mean that the



auction ends near the reserve price – which could be well below the competitive price and means that the spectrum is not freely moving towards its most highly valued use.

If one or two carriers acquire the majority of the 3.6 GHz spectrum, there is no incentive for them to engage in secondary spectrum trading or third party access arrangements with MNOs that don't have 5G spectrum. Additionally, if only one or two carriers have the capacity to deploy 5G networks, there would likely be less competition between those carriers and therefore less incentive to develop competitive 5G networks and invest in infrastructure, particularly in regional areas.

Option 2 (limits of 45 MHz in metropolitan Sydney and Melbourne and 60 MHz in all other areas) addresses some of the government's communications policy objectives. In its advice, the ACCC placed a strong emphasis on the importance of a fourth carrier entering the market. The limits in option 2 are designed to ensure that Optus and nbn are prevented from bidding and that TPG obtains spectrum sufficient to compete with relevant markets. It has the benefit to consumers of ensuring that all MNOs have sufficient spectrum to deploy 5G networks in the short-term. Guaranteeing that all carriers are able to access sufficient spectrum for a 5G network promotes competitive market outcomes.

The Department assesses that the limits proposed in option 2 would not support the efficient allocation and use of the spectrum in the Sydney and Melbourne metropolitan areas as well as option 3. Allocative efficiency in an auction is constrained when allocation limits result in a scenario where supply is equal to or exceeds demand. In the case of the 125 MHz of 3.6 GHz spectrum to be auctioned, limits of 45 MHz in the Sydney and Melbourne metropolitan areas means the likely three eligible bidders (Telstra, TPG and VHA) are able to purchase almost equal amounts of spectrum. This would result in a lack of competitive tension in the auction in the Sydney and Melbourne metropolitan areas where aggregate demand would only be slightly greater than aggregate supply.

The limits proposed in option 2 partially support the deployment of 5G networks by ensuring that more carriers are able to acquire sufficient spectrum to deploy viable 5G networks. However, current 3GPP deployment standards for the 3.4–3.7 GHz bands stipulate that 5G networks must be deployed on bandwidths of 100 MHz, 90 MHz, 80 MHz, 70 MHz, 60 MHz, 50 MHz, 40 MHz, 30 MHz, 20 MHz, 15 MHz and 10 MHz. Allocation limits of 45 MHz in Sydney and Melbourne metropolitan areas are not consistent with the deployment standards set by 3GPP. It is feasible that three MNOs could acquire 40 MHz of spectrum to roll out basic 5G networks, leaving a 5 MHz lot unsold. Unsold lots are a further indication that spectrum is not being allocated efficiently.

In submissions to the ACCC's consultation process, a number of MNOs stated that 40 MHz was the minimum amount of spectrum that could be used to deliver 5G services. Capping bidders at 45 MHz could hamper MNOs' abilities to deploy networks that maximise the benefits of 5G technologies. A higher limit would facilitate the market being able to compete for and price spectrum in a way that it considers supportive of the deployment of robust 5G networks.

The limits proposed in option 2 partially support the Government's policy objective of encouraging investment in infrastructure by ensuring that more MNOs are likely to be able to deploy 5G networks. Metropolitan consumers experience competitive offerings from all MNOs and many mobile virtual network operators (MVNOs). However, the regional communications market in Australia remains dominated by two MNOs with substantial spectrum holdings and infrastructure to deliver services to regional Australians. Allocation limits in regional Australia should reflect the fact that there are likely to be only two or three bidders vying for 3.6 GHz spectrum in regional areas at auction. They also need to take into account that the geographic lots for existing holdings are different (and often smaller) than the geographic lots proposed for the 3.6 GHz auction. Despite a potentially smaller pool of participants in the auction in regional areas, allocation limits are required to prevent large carriers from acquiring all of the 3.6 GHz spectrum being sold and blocking smaller carriers from competing in those areas.



Encouraging all carriers, including the smaller ones, to invest in networks and infrastructure in regional areas is a policy objective of the Government to promote a competitive communications market for Australians and businesses outside metropolitan areas. Allocation limits provide smaller carriers with the opportunity to compete with larger carriers who may already have established networks. Allocation limits of 60 MHz in regional areas risk MNOs having spectrum holdings that are too low to roll out productive 5G networks, particularly outside of regional centres.

A table showing how the allocation limits proposed in option 2 would impact on aggregate demand is at [Attachment A](#).

Option 3 is consistent with all of the Government's communications policy objectives. The limits proposed in option 3 also ensure that more carriers have the opportunity to acquire sufficient 3.6 GHz spectrum to deploy a viable 5G network and that those carriers with substantial existing holdings in bands that are a close substitute for the 3.6 GHz band are precluded from participating in the auction in those areas.

These limits allow for more efficient allocation of spectrum at auction. Raising the limit in the Sydney and Melbourne metropolitan areas and regional areas would lead to increased aggregate demand for the spectrum being auctioned, which in turn leads to increased competitive tension at auction. This provides more scope for price discovery and increases the likelihood of allocative efficiency.

These limits would not preclude a fourth or hypothetical fifth carrier from participating in the auction, and provide opportunity for smaller carriers such as TPG and VHA to acquire up to 60 MHz of spectrum in all metropolitan areas and up to 80 MHz in all regional areas. [This text has been redacted].

Allocation limits of 60 MHz in the Sydney and Melbourne metropolitan areas would also align with 3GPP deployment standards for 5G networks. Increasing the limit to 60 MHz in the Sydney and Melbourne metropolitan areas would provide the opportunity for MNOs to acquire sufficient spectrum to deploy a 60 MHz 5G network, potentially enabling services of a higher quality than a 40 MHz 5G network.

Increasing the allocation limits to 80 MHz in regional areas recognises that the metropolitan and regional telecommunications markets are different and therefore warrant different allocation limits. The Department assesses that there are still likely to be only two or three bidders vying for 3.6 GHz regional spectrum under this option. However, limits of 80 MHz would allow the MNOs who are already active in the regional telecommunications market to deploy 80 MHz 5G networks in regional centres and deploy at least 40 MHz 5G networks in regional areas. It would also provide all MNOs without existing holdings in regional areas the opportunity to deploy a 5G network of up to 80 MHz. This is consistent with the Government's objective of encouraging investment in infrastructure in regional areas, including by smaller carriers, and providing regional Australians with access to high quality 5G networks.

A table showing how the allocation limits proposed in option 2 would impact on aggregate demand is at [Attachment B](#).



How will you implement and evaluate your chosen option?

The Minister's decision regarding allocation limits will be implemented through a direction to the ACMA under section 60 of the *Radiocommunications Act 1992*, and then incorporated into the allocation procedures ACMA is developing for the upcoming 3.6 GHz spectrum auction.

The Department monitors access to and cost of telecommunications services as part of its business as usual functions and will monitor the same in the emerging 5G market. The telecommunications sector has seen an average drop of 7.1% in prices paid for post-paid mobile services over four years⁵, a range of differentiated products and service available to consumers and an increased number of providers in the market. The Department assesses that the application of allocation limits has supported these positive results, and note that it is not aware of any negative consequences due to the implementation of allocation limits in previous spectrum auctions.

In the case of the 3.6 GHz auction, the Department will evaluate the impacts of the allocation limits by analysing:

- the impacts of the auction on the relevant markets;
- the number of unsold lots at the conclusion of the auction;
- whether smaller players were able to acquire spectrum at the auction, and
- whether carriers acquired enough spectrum to deploy viable 5G networks.

For example, in the 700 MHz residual lots auction in 2017, allocation limits allowed smaller carriers TPG and VHA to acquire spectrum and provided the opportunity for TPG to enter the market as a fourth carrier. The Department assesses those allocation limits as successful and fit for purpose.

Furthermore, the Department and the ACMA are in regular contact with the stakeholders who are likely to be affected by the allocation limits, and will take up opportunities to seek feedback and incorporate lessons learned into future spectrum allocation decisions. The Department and the ACMA also hold data on the total holdings of spectrum and will continue to monitor to ensure no individual provider gains excessive advantages that could lead to an abuse of market power.

The ACCC already monitors the competition of the telecommunications sector through its annual telecommunications report⁶. The report examines the market power of the industry and the price paid by consumers, two aspects of the sector allocation limits seek to improve. Although it is difficult to assess the effects of allocation limits alone, the ACCC is well placed to monitor the overall competition of the industry. Furthermore, given the wealth of information already provided to the ACCC, no further information would be necessary to assess the impacts.

Under section 50 of the *Competition and Consumer Act 2010* (CCA), the ACCC has the power to intervene in the issue of spectrum licences if it believes that issuing the licences will have the effect or likely effect of substantially lessening competition in the relevant market.

⁵ Australian Competition and Consumer Commission (ACCC), *Competition and price changes in telecommunications services in Australia 2016–17*, page viii.

⁶ The most recent version is the *Competition and price changes in telecommunications services in Australia 2016–17* report, which was published February 2018.

Conclusion

The 3.6 GHz spectrum auction will be the first auction of spectrum in Australia that has been specifically identified as useful for the development and deployment of 5G technology. The potential applications of 5G will promote Australia's continued technological innovation and contribute to economic growth. The 5G vision foresees near zero latency and unprecedented data speeds to and from mobile devices. This will have implications for technologies such as the Internet of Things, driverless cars, augmented and virtual reality, remote medical procedures and smart manufacturing.

Spectrum is critical infrastructure for Australia's current and future communications and 5G technology will require substantial amounts of spectrum. As the 3.6 GHz auction is only selling 125 MHz of spectrum there is an incentive for participants to prevent competitors from acquiring enough spectrum to deploy 5G networks or to restrict the new entrant from acquiring spectrum. This could result in anti-competitive outcomes in the mobile market as a small number of MNOs control the price and output in the market, leading to poor outcomes for consumers in terms of price, service and choice.

This RIS has considered a range of options to address this issue.

Limits on the amount of spectrum a participant in the auction can acquire are an effective means of preventing one or two participants from monopolising the spectrum on offer. Limits of 45 MHz in Sydney and Melbourne metropolitan areas and 60 MHz in all other areas provide a competition focussed approach to allocation limits. However the Department recommends limits of 60 MHz in metropolitan areas and 80 MHz in regional areas. These limits take a broader view to supporting the Government's communications policy objectives and promoting competitive tension in the auction.

The recommended limits do not represent a new cost for the industry or consumers. It is an option familiar to the industry as a result of their participation in previous spectrum auctions and is therefore likely to be accepted by auction participants.

Attachment A

Table 2: Impact of allocation limits proposed in option 2

Geographic lots—name	Category	Existing—VHA *	Existing—Telstra *	Existing—TPG *	Existing—Optus *	Existing—NBN *	VHA **	Telstra **	TPG **	Optus **	NBN **	Aggregate demand	Aggregate supply
Sydney	Metro	0	0	0	100	60	45	45	45	0	0	135	125
Melbourne	Metro	0	0	0	100	60	45	45	45	0	0	135	125
Brisbane	Metro	0	32.5	0	67.5	60	60	30	60	0	0	150	125
Adelaide	Metro	0	28	0	72	60	60	35	60	0	0	155	125
Perth	Metro	0	35	0	65	60	60	25	60	0	0	145	125
Canberra	Metro	0	32.5	0	65	60	60	30	60	0	0	150	125
North QLD	Regional	0	35	0	0	97.5	60	25	60	60	0	205	125
Central QLD	Regional	0	35	0	0	100	60	25	60	60	0	205	125
South QLD	Regional	0	32.5	0	2.5	157.5	60	30	60	60	0	210	125
Western NSW	Regional	0	0	0	3.5	160	60	60	60	60	0	240	125
VIC	Regional	0	35	0	0	157.5	60	25	60	60	0	205	125
TAS	Regional	0	28	0	0	100	60	35	60	60	0	215	125
SA	Regional	0	0	0	0	125	60	60	60	60	0	240	125
WA	Regional	0	0	0	65	60	60	60	60	0	0	180	125

* Existing holdings (3.4 GHz–3.7 GHz) (MHz).

** Amount of spectrum carriers could acquire (MHz).



Attachment B

Table 3: Impact of allocation limits proposed in option 3

Geographic lots—name	Category	Existing—VHA *	Existing—Telstra *	Existing—TPG *	Existing—Optus *	Existing—NBN *	VHA **	Telstra**	TPG**	Optus**	NBN**	Aggregate demand	Aggregate supply
Sydney	Metro	0	0	0	100	60	60	60	60	0	0	180	125
Melbourne	Metro	0	0	0	100	60	60	60	60	0	0	180	125
Brisbane	Metro	0	32.5	0	67.5	60	60	30	60	0	0	150	125
Adelaide	Metro	0	28	0	72	60	60	35	60	0	0	155	125
Perth	Metro	0	35	0	65	60	60	25	60	0	0	145	125
Canberra	Metro	0	32.5	0	65	60	60	30	60	0	0	150	125
North QLD	Regional	0	35	0	0	97.5	80	45	80	80	0	285	125
Central QLD	Regional	0	35	0	0	100	80	45	80	80	0	285	125
South QLD	Regional	0	32.5	0	2.5	157.5	80	50	80	80	0	290	125
Western NSW	Regional	0	0	0	3.5	160	80	80	80	80	0	320	125
VIC	Regional	0	35	0	0	157.5	80	45	80	80	0	285	125
TAS	Regional	0	28	0	0	100	80	55	80	80	0	295	125
SA	Regional	0	0	0	0	125	80	80	80	80	0	320	125
WA	Regional	0	0	0	65	60	80	80	80	15	20	275	125

